

of Africa, upon which the triangulation lines are entered. We then see that the British part of the work is imperatively required to extend, and in fact to complete at one end in each case, two important geodetic arcs, viz., the meridional arc along the meridian of Greenwich and the longitudinal arc along the latitude of 52° north. Without the British portions these arcs extend from Ain Sefra in Algeria to Gravelines in France, an amplitude of 18° , and from Orsk in Russia to the same point in France, an amplitude of 57° . With the British section added they would be further extended to Saxavord, the northernmost point of the Shetland Islands, and to Valentia, on the West of Ireland, respectively. The added amplitudes would be 10° and $11\frac{1}{2}^{\circ}$, very material additions, which would undoubtedly prove of substantial scientific value.

It will thus be seen that it is by no means necessary, or even desirable, to re-observe the whole network of triangles covering our islands. All that is required is to connect geodetically the three extreme points—Saxavord, Valentia, and the stations on the Kent coast just mentioned.

A knowledge of the exact figure of the earth is of high scientific importance, especially so in reference to recent speculations as to its possible deviation from a spheroidal form. It cannot be other than a subject of national shame that so important a link in this research remains unfilled. We may note with gratification the forward position that our nation has in the past taken in the advancement of geodesy. We know the great work done in the triangulation of India, and we have alluded to the magnificent conception of the Cape to North Sea arc due to Sir David Gill. Surely it is not asking too much that we should take steps to set our own house in order, and to ensure that our own triangulation is at least as accurate as that covering the neighbouring portions of the continent of Europe. The subject is one upon which the powerful influence of the British Association might legitimately be brought to bear, and any representations from our body would come with a peculiar appropriateness from this the Dublin meeting, seeing that so large a section of the work, the importance of which we wish to urge upon the Government, lies upon Irish soil, the execution of which would therefore devolve naturally on the Ordnance Survey of Ireland.

In concluding this address I feel constrained to apologise for what may have appeared to some of you the dull and unromantic character of my theme. I am too well aware that to many the idea of geographical advance is confined to the perilous traversing of virgin lands, to the navigation of unknown waters, and to the penetration of forests or deserts never yet trod by white men's feet. I am conscious that the substitution of the surveyor for the explorer has necessarily destroyed much of the old romance, and that the feelings born when any fraction of the earth's surface was for the first time opened to our ken can never be revived. While, however, the romance has gone, the dangers remain, and there is as much call now for unflinching courage and for unselfish devotion to duty as there was in the days when the search for the sources of the Nile was an impelling cause sending adventurous men into the unknown. Whether occupied in cutting his way through the almost impenetrable forests of the Gold Coast or struggling with the papyrus swamps of the Nile basin, or whether, standing upon the top of some old volcanic hill, he is engaged in scanning the blue distances of the great Rift valley, the surveyor is not less worthy of your admiration than the earlier traveller whose name is perhaps honourably enshrined in that of river or mountain. Whether pushing his way through the jungles of the Malays or floating upon the muddy stream of an African river, whether he is braving the attacks of savage animals, of treacherous natives, or the far more insidious assaults of the germs of some deadly disease, he is equally deserving of your sympathy and your encouragement. He is in truth a shining example of the power of that spirit of adventure and thirst for information which has carried our race so far in the past, and which in the future is, we all trust, destined to lead us ever "upwards and on"; the spirit that esteems no sacrifice too great in the cause of duty, and recognises no duty so high as that of making some contribution towards the increase of natural knowledge.

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UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

LONDON.—A course of nine post-graduate lectures on "The Scientific Principles of Radio-telegraphy and Radio-telephony" will be given by Prof. J. A. Fleming, F.R.S., at University College on Wednesdays, beginning October 14. The introductory lecture will be addressed to a general audience, and no charge for admission is to be made. Cards of admission must, however, be obtained beforehand by those attending. The succeeding lectures will be free to graduates of the University and to undergraduates in their third year who may be qualified to take advantage of them. A fee of two guineas for the course will be charged to all other persons. Those desirous of attending the course should apply to the secretary, University College, Gower Street, W.C.

THE Rev. W. Lower Carter has been appointed lecturer in geology at the East London College.

PROF. JOSEF MOELLER, of Graz, has been appointed to the chair of pharmacognosia at the University of Vienna.

THE foundation-stone of a new college for the training of teachers was laid at Dudley on Thursday last by the Countess of Dudley. The cost of the building (which will accommodate 100) is 19,000*l*.

CLASSES for the instruction of miners are being started at Hamstead by the Staffordshire County Council, which will, it is hoped, enable many miners who possess sufficient practical knowledge, but who lack the necessary scientific and other training, to fill higher positions in the mines.

THE new municipal college at Portsmouth was opened on Thursday last by the Mayor of the town. The building, which is the outcome of a scheme for higher education organised by the local education authority, is an adaptation of the best ideas of the principal technical institutes of the country to the requirements of Portsmouth, and is stated to be in its equipment one of the most modern in England.

THE following arrangements have been made for the opening of the winter session of certain of the medical schools. At Guy's Hospital (in connection with the Physical Society), Sir R. Douglas Powell will deliver an address on October 8 entitled "Just Procedure of Medicine"; Dr. Charles Slater is to speak on October 1 at St. George's Hospital on "The Laboratory in Medical Education and Practice"; on the same date an address will be delivered at the Middlesex Hospital by Dr. A. M. Kellas; at King's College Hospital Prof. Alexander MacAlister, F.R.S., will deliver an address on October 1; Sir Edward Fry, F.R.S., is to speak at University College Hospital on October 2. At St. Mary's Hospital, on October 1, an address is to be given by Sir John Broadbent; Dr. Harrington Sainsbury is to speak on the same day at the London School of Medicine for Women; at the West London Post-graduate College an address is to be given on October 13 by Sir R. Douglas Powell; Dr. R. Jones is to speak on "Insanity, Wit, and Humour" on October 1 at the Polyclinic; at the North-East London Post-graduate College Mr. Jonathan Hutchinson, F.R.S., is to speak on October 8; Sir T. Clifford Allbutt, K.C.B., F.R.S., is to give an address at the University of Manchester, on October 1, on "Hospitals, Medical Science, and Public Health"; and at University College, Bristol, on October 1, Sir Rubert Boyce, F.R.S., is to speak.

THE approaching winter session in our technical colleges and schools is being heralded by the publication of numerous attractive and carefully compiled year-books and prospectuses of the various institutions in London and the provinces. We have received a number of these helpful guides, and, without exception, they provide intending students with valuable assistance in the choice of classes and hints from experienced teachers as to how to plan courses of work likely to be of service in various industries. Among recent syllabuses published in connection with London institutions we notice those of the Northampton Polytechnic Institute, the Sir John Cass Technical Institute, and the East Ham Technical College. At the Northampton Institute there are provided

for next session day and evening courses in mechanical and electrical engineering, technical optics, horology, and artistic crafts, in addition to numerous other classes in a varied selection of subjects. The recent provision of increased accommodation obtained by the occupation of the British Horological Institute not having been found sufficient for the requirements of this institute, an additional building is being erected in the courtyard, and it is hoped that the greater part of it will be available immediately after Christmas. It is interesting to observe that in the technical optics department there will be classes for cinematograph operators in continuation of the pioneer classes last session. In these classes an attempt is to be made to safeguard the holding of cinematograph exhibitions by giving a practical training to the operators in charge of the apparatus. At the Sir John Cass Institute the instruction is devoted especially to technical training in experimental science and in the artistic crafts. Graded curricula of study, extending over several years, are provided in pure and applied chemistry, metallurgy, art metal work, jewellery, enamelling, bronze casting, and chasing. Full courses of study are also provided in drawing, design, and modelling in connection with these crafts, drawing and modelling from living animals being a special feature. In addition to the evening classes at the East Ham College, conducted in eight departments and intended to supply the particular educational needs of the district, there is a well-staffed secondary school for boys and girls.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 25.—"The Spectrum of Scandium and its Relation to Solar Spectra." By Prof. A. **Fowler**. Communicated by Sir William Crookes, F.R.S.

(1) The arc spectrum of scandium consists of two distinct sets of lines, which behave very differently in solar spectra. Each set includes both strong and faint lines.

(2) Lines belonging to one set correspond with the enhanced lines of other elements, notwithstanding that they appear strongly in the ordinary arc spectrum:—(a) these lines are very feeble or missing from the arc-flame spectrum, and are strengthened in passing to the arc, the arc in hydrogen, or the spark; (b) they occur as relatively strong lines in the Fraunhofer spectrum; (c) they are weakened in the sun-spot spectrum; (d) they occur as high-level lines in the chromosphere.

(3) The remaining lines show a great contrast when compared with the first group:—(a) they are relatively strong lines in the arc-flame; (b) they are very feebly represented in the Fraunhofer spectrum; (c) the stronger lines are prominent in the sun-spot spectrum; (d) they have not been recorded in the spectrum of the chromosphere.

(4) The special development of the enhanced lines in the Fraunhofer spectrum, together with their presence in the upper chromosphere, indicates that the greater part of the scandium absorption in the solar spectrum originates at a higher level than that at which the greater part of the iron absorption is produced.

(5) The discussion of scandium lines indicates that while in the case of some elements solar identifications are to be based chiefly on arc lines, in others it is the enhanced lines which may be expected to show the most important coincidences.

(6) The flutings which occur in the arc and arc-flame do not appear when the arc is passed in an atmosphere of hydrogen. As suggested by Thalén, they are probably due to oxide of scandium.

Tables are given which show the lines of the arc spectrum from 3930 to 6580, the positions of the oxide flutings, and comparisons of the principal lines of the two classes with the sun, sun-spots, and chromosphere.

PARIS.

Academy of Sciences, September 7.—M. Bouchard in the chair.—Vortices in the solar atmosphere: H. **Deslandres**. The filaments (the *long flocculi* of Hale) are considered to be vortices with horizontal axes, parallel

to the surface, and traces of the effects of these are to be found right across the face of the sun. Six diagrams showing the alignment of these on the sun's surface at different dates are given. Similar effects may be expected on the earth, and the application of the theory here developed to the problems of terrestrial meteorology may give interesting results.—The new Marehouse comet: M. **Giacobini**. Observations were made on September 3, 4, and 5. The apparent positions of the comet are given on these dates, together with the mean positions of the comparison stars. The comet shows as a rounded nebulosity of about 15" to 20", with a badly defined nucleus. A small tail, with a position-angle of 250°, can be distinguished.—The law of Stokes and the Brownian motion: Jean **Perrin**. The force opposing the motion of a sphere in a viscous liquid has been calculated by Stokes as a function of the viscosity of the fluid, the radius of the sphere, and its velocity. From experiments with emulsions of gutta, the author shows that this law is verified for spheres having a radius of about a tenth of a micron. The assumption of the applicability of this law, made by the author in his previous work on this subject and criticised by J. Duclaux, is thus shown to be well founded.—The fixation of acetophenone on benzoyl-acrylic acid: J. **Bougault**. Von Pechmann has shown that boiling solutions of alkalis decompose benzoylacrylic acid into glyoxylic acid and acetophenone. In the cold the reaction is different, some diphenylacetic acid being produced. The yield of the latter acid is increased if some acetophenone is added to the alkaline solution, and the author gives reason to suppose that a direct condensation between the acid and the ketone takes place under these conditions.—The ages of the basalts in the neighbourhood of Massiac, Cantal: P. **Marty**.—The existence of transported strata in the north-east of Algeria: L. **Jolsaud**.

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